

Weekly Report (2015.7.27~8.2)

Done

- 1) Learned some examples of D3.js and tried several layouts for 3,000 nodes as a requirement in the HUAWEI project.

Here is the results, I have tried

1. force-directed layout for a node-link graph with 3,000 nodes and 18,027 links.

Since I generated this data randomly, the whole graph looks like a dense cluster and thus we can not visualize it well with a force-directed layout, even if the link is already sparse (only 0.4% links compared to a complete graph).

Meanwhile, this method takes a relatively long time to iterate a good result, like tens of seconds.

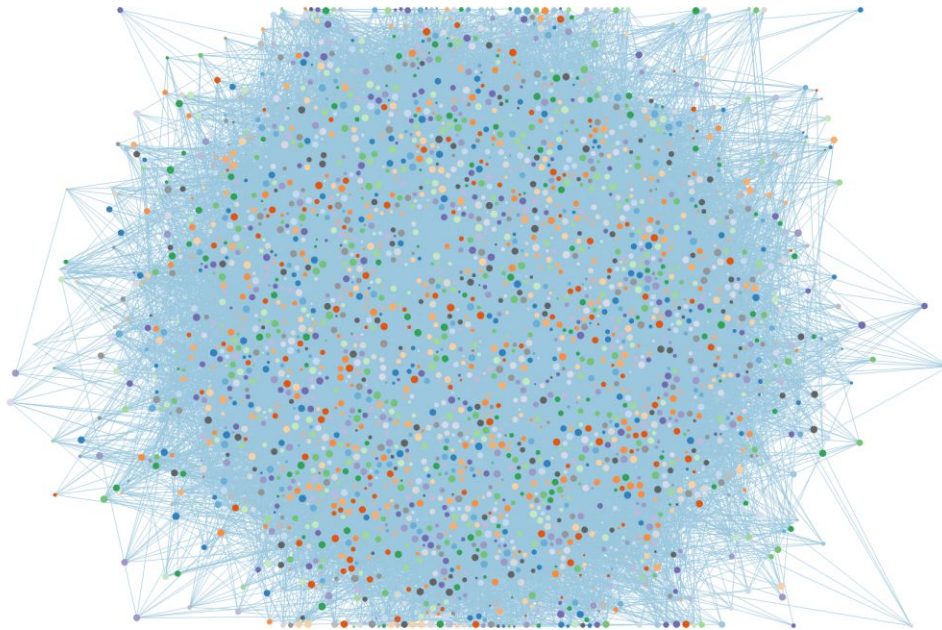


Figure 1 randomly generated network with 3,000 nodes and 18,027 links, force-directed layout

To see how force-direct layout works for real data, I also tried it on a real network provided by Fangzhou, with 1767 nodes and 6453 links. From the result below, we can see several clusters, which is better than it is in the random case shown above. But this straight-forward method once again fails to visualize network data with such a scale well.



Figure 2 real world network with 1767 nodes and 6453 links, force-directed layout

2. Treemap layout for 3,000 nodes.

Though this layout used up the screen space and is without overlap between nodes, I feel those rectangles appeared too small when shown on a screen with a resolution of 1920*1080.

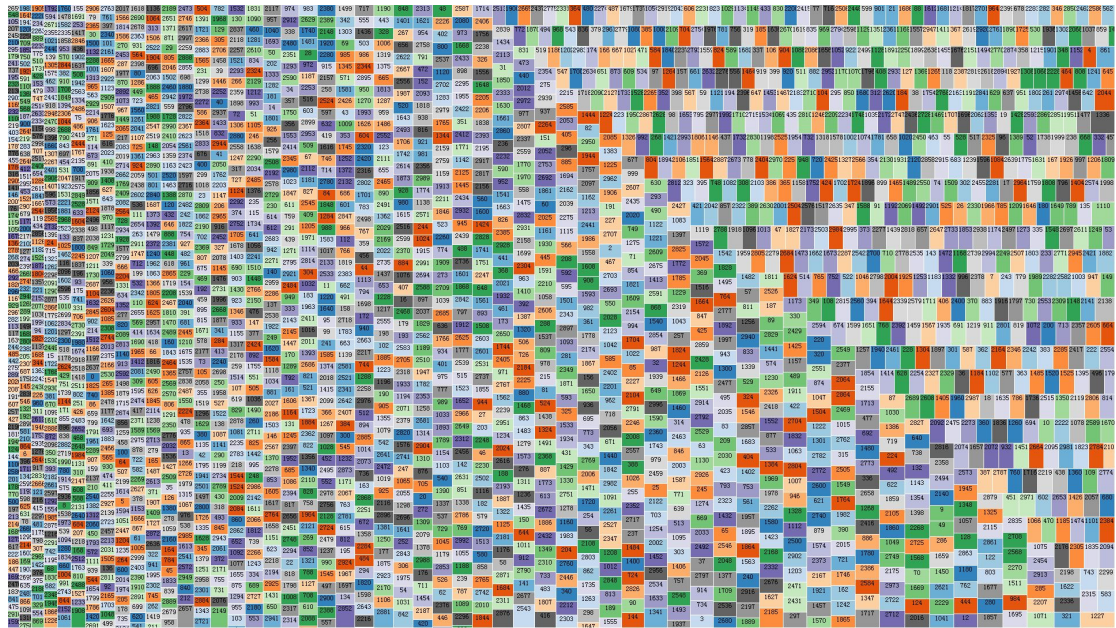


Figure 3 3,000 randomly generated nodes visualized with treemap.

3. Finally, I tried a “bubble layout”. This layout is implemented with force-direct algorithm, but without links. Also, collision detection is employed to avoid overlap.

The size of each node is smaller than it is in the treemap layout, but I feel this layout looks better, by encoding each node with a circle and with a small gap between each circle.

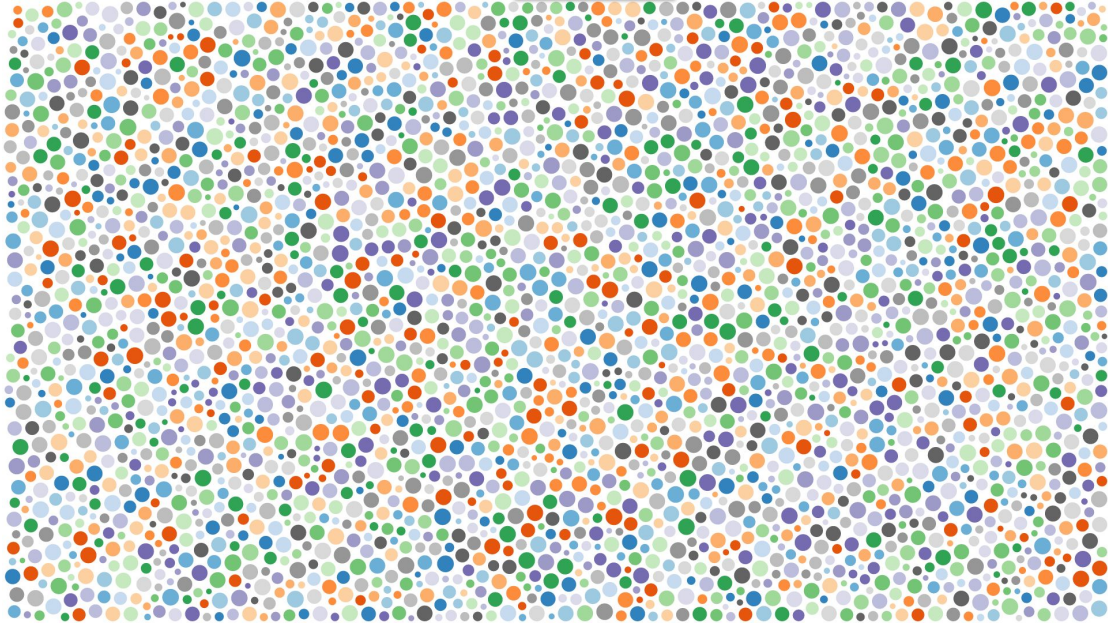


Figure 4 randomly generated data with 3,000 nodes

As a conclusion, I think layout 3,000 nodes directly onto a screen with a resolution of 1920*1080 can not really gain a good result, some kinds of LOD methods should be necessary for visualizing such a large network.

However, as to the three layouts shown above, I think the last one is the best.

To Do

- 1) Discuss with Fangzhou and Lintao about the visual design of the group visualization as a part of the HUAWEI project, and finish the design report.